

Claims

1. A process for preparing an orthopaedic scaffold, said process comprising forming shaped blocks of a bioactive material comprising silicon, treating one or more selected surfaces of said blocks such that they will adhere to a similarly treated surface of a similar block, self-assembly of a scaffold comprising two or more of said blocks under conditions in which the treated surfaces will bind together, and thereafter recovering the assembled structure.
2. A process according to claim 1 wherein the said blocks are square or hexagonal in cross section.
3. A process according to claim 1 or claim 2 wherein the blocks will be at least partially porous.
4. A process according to any one of the preceding claims wherein the bioactive material comprises bulk crystalline silicon, amorphous silicon, porous silicon, polycrystalline silicon, or a composite of bioactive silicon and another material.
5. A process according to claim 4 wherein the bioactive material is a composite of bioactive silicon and a biocompatible polymer.
6. A process according to claim 5 wherein the composite is obtained by mixing bioactive silicon particles with a polymer in powder or granular form, and heating the resultant mixture so as to fuse it.
7. A process according to claim 6 wherein the mixture is heated in a mold to form a block of a desired shape.

8. A process according to claim 6 wherein the polymer has a melting point of less than 150°C.

9. A process according to any one of claims 5 to 8 wherein the biocompatible polymer is polycaprolactone.

10. A process according to any one of claims 5 to 9 wherein the mass ratio of silicon:organic polymer in the composite is from 1:99 to 99:1.

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11. A process according to claim 10 wherein the mass ratio of silicon: organic polymer is in the range of from 1:20 to 1:4w/w.

12. A process according to any one of the preceding claims wherein the surfaces bind together by forming covalent chemical bonds therebetween.

13. A process according to any one of the preceding claims wherein the said one or more surfaces of the blocks are treated so as to increase the density of silanol groups (SiOH) thereon.

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14. A process according to claim 13 wherein the said one or more surfaces are exposed to an oxygen-rich plasma, and thereafter mixed with similarly treated blocks in the presence of a coupling agent.

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15. A process according to claim 14 wherein the coupling agent is an alkoxysilane.

16. A process according to claim 15 wherein the alkoxysilane is in aqueous solution.

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17. A process according to any one of claims 4 to 12 wherein the said one or more surfaces of the blocks are treated so as to enrich the amount of silicon exposed thereon and thereafter mixed

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with similarly treated blocks in the presence of a coupling agent.

18. A process according to claim 17 wherein the coupling agent
5 is a polysaccharide.

19. A process according to claim 18 wherein the coupling agent is a starch.

10 20. A process according to any one of the preceding claims wherein the surface of the assembled structure is treated to alter its biological activity.

21. A process according to any one of the preceding claims
15 wherein the assembled structure is heated to raise its mechanical strength.

22. An orthopaedic scaffold comprising a plurality of blocks of a bioactive material comprising silicon, adhered together.
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23. An orthopaedic scaffold according to claim 22 wherein the bioactive material comprises a composite of silicon and a biocompatible polymer.

24. An orthopaedic scaffold according to claim 22 or claim 23 wherein the blocks are adhered together by means of covalent bonds.

25. A process for preparing solid object, said process
30 comprising forming shaped blocks of a material comprising silicon, treating one or more selected surfaces of said blocks such that they will adhere to a similarly treated surface of a similar block, and self-assembly of a structure comprising two or more of said blocks under conditions in which the treated
35 surfaces will bind together, and thereafter recovering the assembled structure.

26. A process according to claim 23, wherein covalent chemical bonds are formed between the surfaces to bind the blocks together.

5 27. A process for preparing solid object, said process comprising forming shaped blocks of a material, treating one or more selected surfaces of said blocks such that they will adhere to a similarly treated surface of a similar block, and self-assembly of a structure comprising two or more of said blocks
10 under conditions in which the treated surfaces will form covalent chemical bonds therebetween, and thereafter recovering the assembled structure.

28 A process for preparing an orthopaedic scaffold
15 substantially as hereinbefore described with reference to the Examples.